

Head & Neck: Parotid Pleomorphic Adenoma



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Patient history

46 year-old man, non smoker, with a right parotid mass detected several months ago. The mass is solid but mobile, the patient shows no weight loss, nor pain or facial paralysis. An MRI is performed using conventional sequences, diffusion weighted imaging (DWI) and dynamic contrast enhancement (DCE).

Morphological findings

Conventional sequences were spin echo T1 (T1WI), spin echo T2 (T2WI) and T1WI after injection of gadolinium (T1WI C+). Conventional MRI shows a 27mm tissue mass located anteriorly in the superficial lobe of the right parotid gland. Hypointense T1, hyperintense heterogeneous T2 finely encapsulated, with slight heterogeneous enhancement, suggestive of a pleomorphic adenoma. In T2, a hypointense posterior nodule (13 mm) is seen, suggestive of epithelial content within the mass or foci of carcinoma.

No obvious lymph node metastases were seen.

Post-processing and analysis

Dynamic maps such as Peak Enhancement, Curve Washout, Washin, Ktrans were computed using the

Extended Tofts Model available in the Automated Head & Neck Olea Sphere® application (Olea Medical®, La Ciotat, France).

A multiparametric display (Permeability maps, T1, T2, ADC) available in Olea Sphere® was used to draw regions of interest and to provide quantitative values of the tumor metrics.

Diffusion-Weighted Images (DWI)

In the light of multiparametric data, DWI and DCE show two different functional behaviors within the two components described. On DWI, the anterior part of the mass shows signs of hypocellularity ($ADC=2.2 \cdot 10^{-3} \text{ mm}^2/\text{s}$), whereas the nodular posterior part shows a more cellular content, ($ADC=1.5 \cdot 10^{-3} \text{ mm}^2/\text{s}$), but still considered hypocellular (Yabuuchi et al, Radiology, 2008).

Dynamic contrast enhancement (DCE) post-processing using permeability models

DCE confirms the two different perfusion profiles: the anterior hypocellular component shows a slow wash-in and a TTP over 300s, being considered benign (Yabuuchi et al, Radiology, 2008) [Ref. 1]. Conversely, the posterior hypercellular component shows a fast Wash-in, a TTP of about 100s and a slow wash-out.

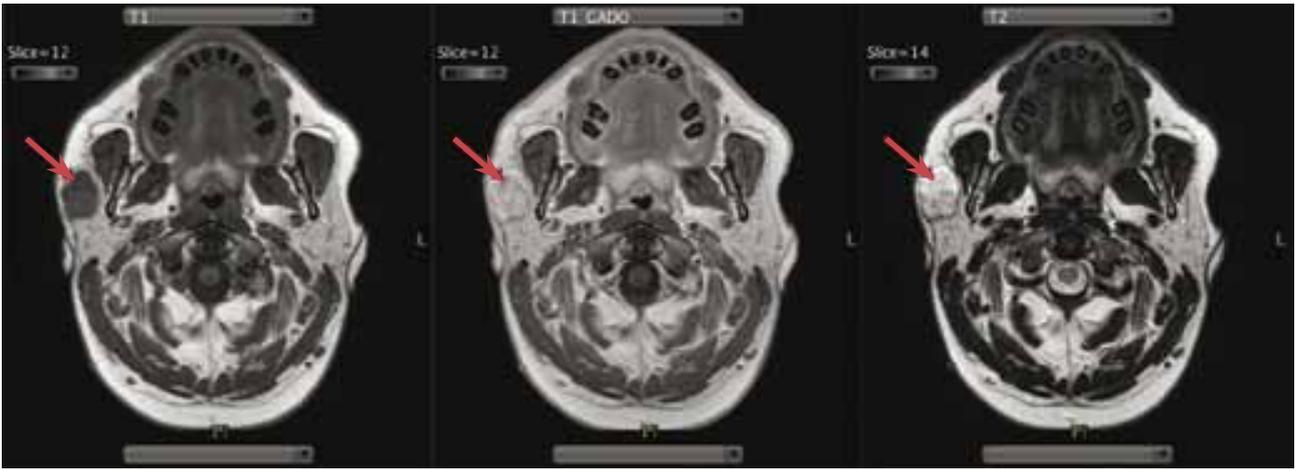


Figure 1 Superficial lobe lesion of the right parotide;
 Axial T1WI and T1WI C+: hypointense lesion with enhancement
 Axial T2WI: hyperintense and heterogenous lesion.

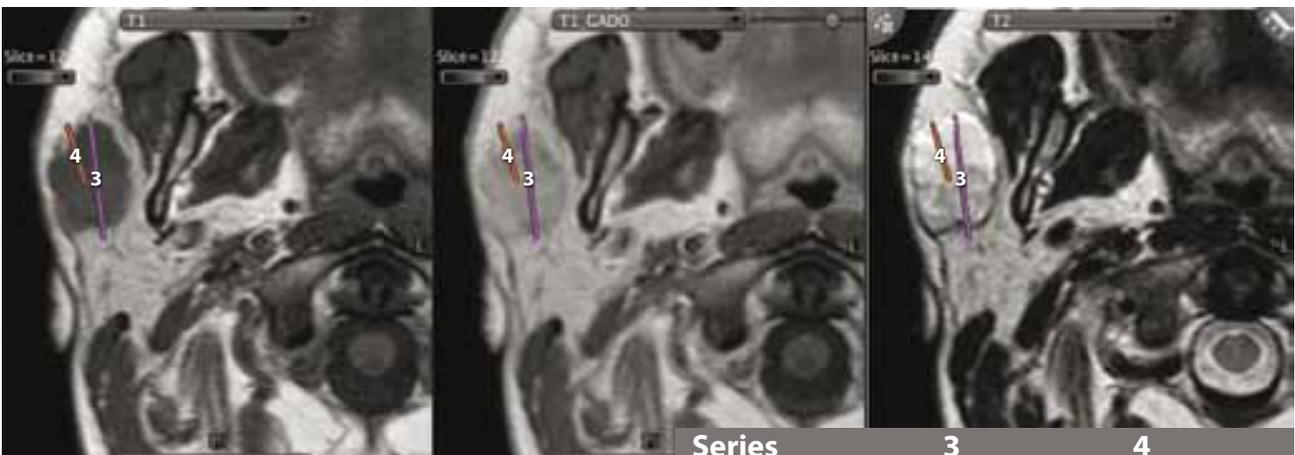


Figure 2 Major axis of the tumor (3): 27 mm
 and major axis of the posterior nodule (4): 13 mm

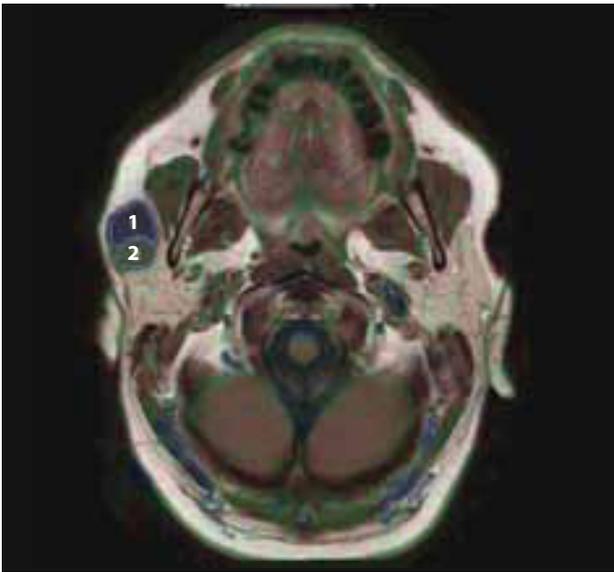
Series	3	4
T1_GADO	27.02 mm	13.13 mm
T1	27.02 mm	13.13

Histopathology diagnosis

The final histological examination confirmed the diagnosis of benign mixed tumor (pleomorphic adenoma) with two histopathologic components, i.e. myoepithelial with rich stroma anteriorly and a rich epithelial content posteriorly.

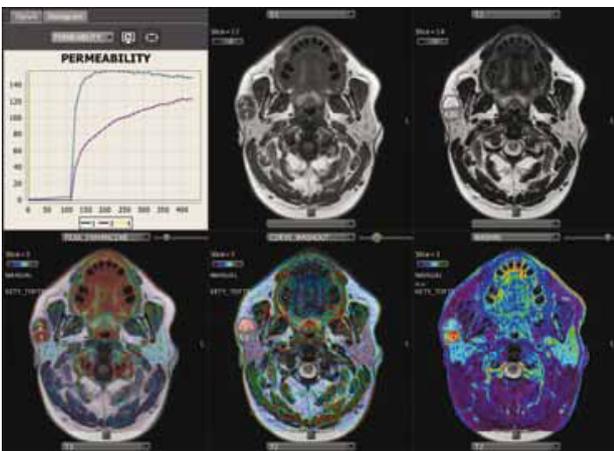
Conclusion

Malignant transformation of a pleomorphic adenoma (carcinoma ex pleomorphic adenoma) is the major complication of pleomorphic adenoma. In the case presented, DCE and DWI confirmed that the posterior cellular component had functional parameters in the range of benign masses, rejecting the malignant transformation hypothesis. Precise post-processing algorithm is the key of correct functional assessments.



Series	1	2
B1000	36.1	52.04
B0	332.93	244.14
ADC	2229.78	1544.12

Figure 4 & 5: Fused ADC/T1 to switch from one map to another; Regions of interest (ROI) 1 and 2 located in each of the tumor components; Values obtained on the ADC in these 2 ROI: 2.2 10^{-3} mm^2/s (anterior) and 1.5 10^{-3} mm^2/s (posterior)



Series	1	2
T1	153.59	145.22
B0	207.75	290.59
WASHIN	0.66	0.34
PEAK_ENHANCEMENT	205.84	95.62
CURVE_WASHOUT	1.9	41.81

Figure 7 Quantitative values on the regions of interest 1 (anterior part) and 2 (posterior part): Washin: 0.66 and 0.34; Peak enhancement: 205.84 % and 95.62 %; Curve Washout: 1.9 % and 41.81%

Figure 6 Multiparametric display: T1, T2, Peak enhancement, Curve Washout, Washin and Permeability curves (Mean curves of ROI 1 and 2 confirming the 2 different behaviors of the anterior and posterior components within the lesion)

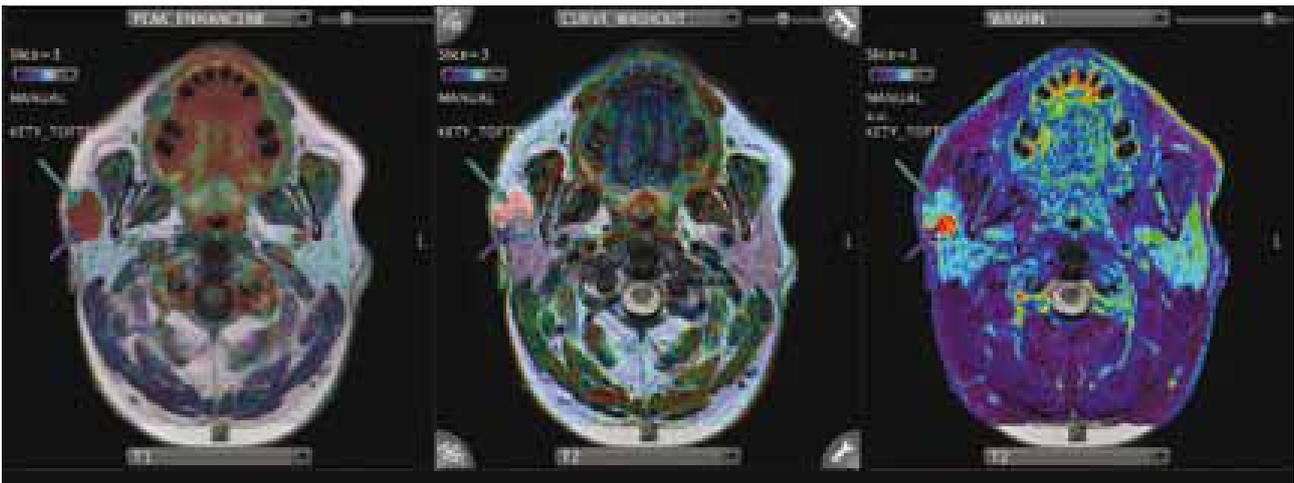


Figure 8 2 components of the tumor pointed out on the Overlay T1/Peak enhancement; T1/Curve washout; T1/Washin

References

1. Yabuuchi et al. Parotid Gland Tumor: Can addition of Diffusion-weighted MR imaging to Dynamic Contrast-enhanced MR imaging improve diagnostic accuracy in characterization? Radiology, Volume 249: Number 3, December 2008.

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